May 20, 1941. C. V. LISLE 2,242,830

MAGNETIC PLUG

Filed Jan. 16, 1939

Fig. 1.

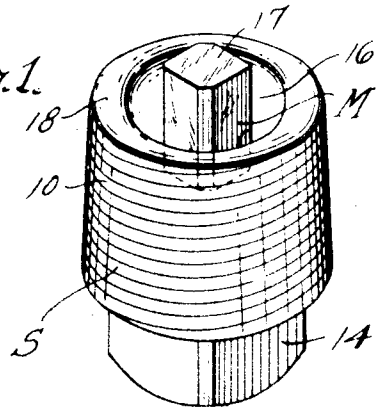


Fig. 2.

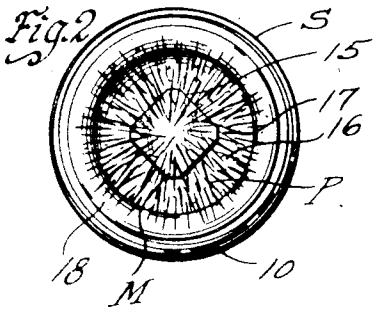


Fig. 3.

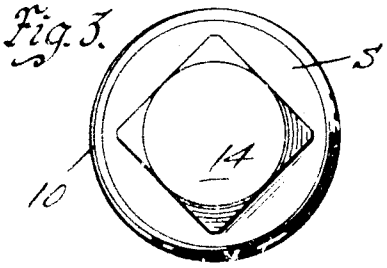


Fig. 4.

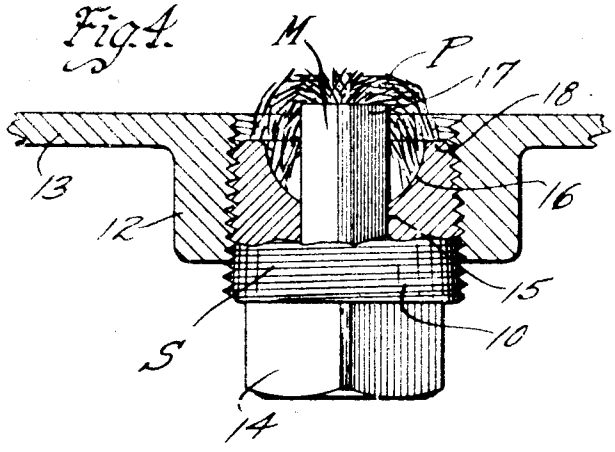
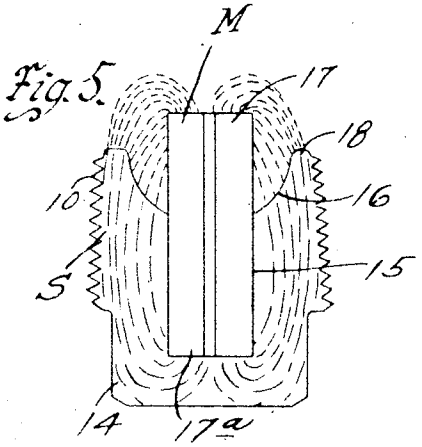


Fig. 5.



Inventor
Charles V. Lisle
by Bair & Freeman
Attorneys

Patented May 20, 1941

2,242,830

UNITED STATES PATENT OFFICE

2,242,830

MAGNETIC PLUG

Charles V. Lisle, Clarinda, Iowa, assignor to Lisle Corporation, Clarinda, Iowa, a corporation of Iowa

Application January 16, 1939, Serial No. 251,194

4 Claims. (Cl. 209—215)

An object of my invention is to provide a magnetic plug or a plug of the kind adaptable to be inserted in the drain or filling opening of a crankcase, transmission housing, differential housing or other article of machinery containing oil and moving parts, the plug being provided with a magnet for attracting any broken pieces of metal or other particles of metal produced by wear of the parts.

A further object is to provide a magnetic plug which can be economically manufactured and thereby sold at a very low price.

A further object is to provide a magnetic plug in which a bar magnet can be effectively used, the magnet with relation to the plug and the material of the plug being such that the full magnetism of the bar magnet is utilized in a very effective manner to concentrate the magnetic flux across the air gap of the magnetic plug so as to attract and retain a maximum of particles in such manner that they are not readily dislodged when removing the plug for the purpose of cleaning the particles therefrom.

Still a further object is to provide a magnetic plug consisting of a shell that is formed of magnetism conducting material, the shell having a socket into which one end of the magnet is inserted preferably by a press fit, the other end of the magnet being arranged to project out of a pocket in the plug to a position slightly beyond the end of the plug, whereby an air gap is provided across the space between the pocket and the outer end of the magnet; the plug being operable to readily conduct the magnetism from the inner end of the magnet to the pocket so that the magnetic flux is concentrated across the space mentioned.

A further object is to provide the pocket in the plug surrounding the magnet so that the pocket forms an annular magnetic pole while the outer end of the magnet forms the other magnetic pole, the two poles being thus relatively close together without the necessity of having to provide a more expensive type of horseshoe magnet in order to bring the opposite magnetic poles adjacent each other.

Other objects, purposes and characteristic features of my invention will be partially obvious from the accompanying drawing and partially pointed out as the description of the invention proceeds. In describing the invention in detail, reference will be made to the accompanying drawing, in which like reference characters designate corresponding parts throughout the several views, and in which

Figure 1 is a perspective view of a magnetic plug embodying my invention;

Figure 2 is a plan view thereof showing the plug loaded with particles adhering thereto and bridging the magnetic air gap of the plug;

Figure 3 is a bottom plan view of the plug;

Figure 4 is a sectional view of a crankcase housing or the like showing my plug mounted therein, the plug being partially in side elevation and partially in section, and

Figure 5 is a diagrammatic sectional view showing the action of the plug body and magnet with relation to each other.

On the accompanying drawing I have used the reference letter S to indicate generally a shell and M a magnet. The shell S is screw threaded as indicated at 10 so that it may be screwed into a threaded boss 12 of a crankcase or the like 13. The outer end of the shell is provided with a squared portion 14 adapted to coact with a wrench for the purpose of inserting or removing the shell relative to the boss 12.

The shell S is provided with a socket 15 adapted to receive the magnet M. Preferably, the socket 15 is of the same shape as the magnet and of such size relative thereto that the magnet must be put in under pressure whereby, due to the press fit, it will remain permanently in position against any possibility of accidental dislodgment from the shell. The outer end of the shell is provided with a pocket 16 surrounding the magnet M.

The shell S is formed of magnetism conducting material, such as ferrous metal, and this is a very important consideration in the construction of the plug. Heretofore magnetic plugs have been made of brass or the like in which the magnets were of the horseshoe type. Brass was used because it insulated the magnet from the boss 12, whereas if an iron shell were used there would be considerable leakage across from the magnet to the boss and this greatly weakens the effect of the magnet. It was also desirable to use horseshoe magnets in order to get the poles relatively close together so as to concentrate the magnetic flux across the air gap between them.

By using a bar magnet as I do, however, and forming the shell S of a magnetism conducting material, I secure the desirable result of the magnetic poles being relatively close together and the further result of one of them being annular and surrounding the other one. In this connection, with reference to Figure 5 the poles of the magnet are indicated at 17 and 17a. The poles of the magnetic plug, however, are the pole

17 and the pocket 16, including the upper annular peripheral edge 18 thereof. Thus the pocket 16 and the peripheral edge 18 form an annular pole surrounding the pole 17. The result of such an arrangement is a conduction of the magnetic lines of force readily through the shell S, as indicated by dash lines in Figure 5, and a concentration of the magnetic flux in the air gap, as shown by dotted lines.

As a result of the described arrangement, particles (indicated at P in Figures 2 and 4) may substantially fill the pocket 16 and bridge across from the pocket and its edge 18 to the pole 17. A considerable quantity of the particles may thus be attracted and retained because of the concentration of the magnetic flux in the air gap and the arrangement of the pocket surrounding the magnet so that the pocket may contain a considerable quantity of particles. This arrangement also lends itself to ready removal of the shell without disturbing the particles, so that none of them fall back into the interior of the crankcase but all are removed therefrom.

From the foregoing description, it will be obvious that I have provided a magnetic plug which can be manufactured inexpensively because bar magnets are much less expensive than horseshoe magnets to manufacture particularly because they do not require any forming operation prior to being hardened and magnetized. The shell S can be made of castiron or the like and is thus much less expensive than one made of brass or other metal which does not conduct magnetism.

Having described one specific embodiment of my invention together with the operation thereof, I desire it to be understood that this form is selected merely for the purpose of facilitating disclosure of the invention rather than for the purpose of limiting the number of forms which it may assume. It is to be further understood that various modifications, adaptations and alterations may be applied to the specific form disclosed to meet the requirements of practice without in any manner departing from the spirit and scope of the patent invention except as set forth in the claims appended hereto.

I claim as my invention and desire to secure by Letters Patent of the United States:

1. In a magnetic plug for transmission housings and the like, a shell formed of a material which is capable of conducting magnetism, said shell having a socket therein, a bar magnet having one end in said socket and its other end projecting from said shell, said magnet having substantially one half thereof in said socket and one half thereof projecting through said pocket, said other end of said magnet constituting one pole of the magnetic plug, the material of said shell surrounding said pole constituting an annular pole complementary to said first pole due to the magnetism conducted thereto from the first mentioned end of said magnet by the material of said shell and said annular pole terminating closer to said other end of said magnet than the diameter of the magnet.

2. In a magnetic plug for transmission housings and the like, a shell formed of magnetism conducting material, a pocket in one end of said shell, a socket at the bottom of said pocket, a bar magnet in said socket and projecting through said pocket to a position beyond said end of said shell, the terminal end of said magnet projecting beyond the end of said shell a distance less than the diameter of the magnet, the material of said shell surrounding said socket being substantially as thick as the diameter of said magnet and the material of said shell forming said pocket tapering to less thickness at its terminal edge, and means on the end of said shell opposite said pocket to position and remove the shell relative to said transmission housing.

3. In a two pole magnetic plug for transmission housings and the like, a shell having an annular end constituting one pole of the magnetic plug and a bar magnet extending into said shell and the outer end of said shell constituting the other pole of said magnetic plug with said annular end constituting an annular pole surrounding said bar magnet, said shell being substantially as thick as the diameter of said bar magnet, said annular pole having a tapered terminal edge, and means on said shell to remove and position the same relative to a transmission housing or the like.

4. In a magnetic plug for transmission housings and the like, a shell formed of a material which is capable of conducting magnetism, said shell having a socket therein, a bar magnet having one end in said socket and its other end projecting from said shell, said other end constituting one pole of the magnetic plug, the material of said shell surrounding said pole constituting an annular pole complementary to said first pole due to the magnetism conducted thereto from the first mentioned end of said magnet by the material of said shell, said annular pole having its terminal edge closer to said other end of said magnet than the diameter of the magnet.

CHARLES V. LISLE.